

# Stanford

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Deputy Director, Center for Cancer Nanotechnology Excellence, Rad/Molecular Imaging Program at Stanford

### CONTACT INFORMATION

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### Bio

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#### CURRENT ROLE AT STANFORD

Deputy Director, Center for Cancer Nanotechnology Excellence

#### PROJECTS

- Nanomedicine/Diagnostic and Therapeutic Nanodevices (2002 - present)
- Cancer Theranostics for Brain, Lung, Breast and Prostate (2012 - present)
- Wearable/Implantable Devices (2013 - present)
- Health Monitoring, Precision Medicine, Microbiome (2013 - present)

#### LINKS

- Nanomedicine Site: <http://www.stanford.edu/~dakin/publications.html>

### Professional

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#### PROFESSIONAL INTERESTS

##### RESEARCH INTERESTS

\* Biological Engineering and Micro/Nanomedicine \*

- Chip-based biomedical micro and nano-integrated systems for sensing, diagnosis, and therapy; micro and nano-scale biosensors for cells, proteins, DNA

- Biomimetically Inspired Engineered Systems

- Biosensors, Intelligent Medical Devices utilizing machine learning, artificial intelligence and expert systems to improve functionality and performance

- Polymer-based microfluidic and silicon micromachined chips for infectious agent detection and re-emerging diseases

- Single molecule imaging and image analysis to study cell:pathogen interactions, molecular beacons for intracellular gene expression analysis, Atomic Force

Microscopy, study of viral capsid biomechanics and assembly

- Microbial and cellular engineering for Cancer applications

- Stimuli responsive polymers such as hydrogels for development of micro/nano-devices for drug delivery and biomedical sensing applications.

- Wireless Passive Theranostic Devices for medical monitoring and intervention

\* Genomics/Systems Biology \*

- Reverse Engineering of Signal Transduction Networks and Molecular Pathways: SilicoCyte, Virtual Cellular communities

- Applications of genomics and bioinformatics in molecular profiling of cancer. Identification of predictive tumor markers and anti-cancer small molecule drug leads.

- Artificial intelligence-based collaborative software development for Systems Biology: Fuzzy logic, Neural Nets, Genetic Algorithms, Expert Systems, Pattern Finding, Data Warehousing

\* Gene Therapy/Microbiology/Virology \*

- Microbial and cellular engineering

- Experimental Therapeutics and Diagnostics: Endogenously (Self)-Regulated Gene Therapy; Cellular Re-programming, Therapeutic Transgenics, Correction of genetic defects by via gene replacement

- Molecular basis of disease resistance , susceptibility and coordinated gene regulation. Enhancement of disease resistance via manipulation of host immune components, DNA vaccines and therapeutic modulation of signal transduction pathways by small molecule drugs

- Prediction and computational modeling of genome evolution of RNA viruses (Coronaviridae, influenza). Forced evolution of viruses and emergence of new strains or quasi-species formation

- MEMS and Nano-based Biosensors for detection and continuous monitoring of airborne biothreat agents

## WORK EXPERIENCE

- Deputy Director, Center for Cancer Nanotechnology Excellence and Translation (CCNE-T) - Stanford University (9/1/2010)
- Deputy Director, Center for Cancer Nanotechnology Excellence focused on Therapy Response (CCNE-TR) - Stanford University (5/1/2008)
- Assistant Research Professor (Nanomedicine) - Purdue University (4/1/2005 - 5/1/2008)
- Manager, BioMEMS and BioNano Laboratories, Birck Nanotechnology Center - Purdue University (1/1/2005 - 5/1/2008)
- Senior Research Scientist, School of Electrical and Computer Engineering - Purdue University (1/1/2002 - 12/30/2006)
- Manager, BioMEMS Laboratory, School of Electrical and Computer Engineering - Purdue University (1/1/2002 - 12/30/2006)
- Research Scientist-Genomics, Applied Intelligent Systems Lab, School of Nuclear Engineering - Purdue University (1/1/2000 - 12/30/2001)
- Research Associate, Indiana State ADDL - Purdue University (1/1/1998 - 12/30/2000)
- Research Assistant (Molecular Virology), Department of Comparative Pathobiology - Purdue University (1/1/1993 - 7/30/1998)

## Publications

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### PUBLICATIONS

- **Rapid and specific labeling of single live Mycobacterium tuberculosis with a dual-targeting fluorogenic probe** *SCIENCE TRANSLATIONAL MEDICINE*  
Cheng, Y., Xie, J., Lee, K., Gaur, R. L., Song, A., Dai, T., Ren, H., Wu, J., Sun, Z., Banaei, N., Akin, D., Rao, J.  
2018; 10 (454)
- **Internalization of subcellular-scale microfabricated chips by healthy and cancer cells.** *PLoS one*  
Parizi, K. B., Akin, D., Wong, H. P.  
2018; 13 (3): e0194712
- **Multitarget, quantitative nanoplasmonic electrical field-enhanced resonating device (NE2RD) for diagnostics.** *Proceedings of the National Academy of Sciences of the United States of America*  
Inci, F., Filippini, C., Baday, M., Ozen, M. O., Calamak, S., Durmus, N. G., Wang, S., Hanhauser, E., Hobbs, K. S., Juillard, F., Kuang, P. P., Vetter, M. L., Carocci, et al  
2015; 112 (32): E4354-63

- **Fluorescent Magnetic Nanoparticles for Magnetically Enhanced Cancer Imaging and Targeting in Living Subjects** *ACS NANO*  
Fu, A., Wilson, R. J., Smith, B. R., Mullenix, J., Earhart, C., Akin, D., Guccione, S., Wang, S. X., Gambhir, S. S.  
2012; 6 (8): 6862-6869
- **Theranostics.** *NCI Cancer Nanotechnology Plan (2010-2020)*  
Akin D., S.S. Gambhir  
2010
- **Nanotechnology Research Directions for Societal Needs in 2020.** *Nanobiosystems, Medicine and Health. M.C. Roco, C.A. Mirkin and M.C. Hersham eds.*  
Mirkin C.A., A. Nel, C. S. Thaxton, B.A. Baird, C. Batt, D. Grainger, S.S.Gambhir, D. Akin, O. Zhou, J.F. Stoddart, T.J. Meade, P. Grodzinski, D. Farrell, H.F. Tibbals, J. De Simone  
2010; NSF
- **A cellular Trojan horse for delivery of therapeutic nanoparticles into tumors** *NANO LETTERS*  
Choi, M., Stanton-Maxey, K. J., Stanley, J. K., Levin, C. S., Bardhan, R., Akin, D., Badve, S., Sturgis, J., Robinson, J. P., Bashir, R., Halas, N. J., Clare, S. E.  
2007; 7 (12): 3759-3765
- **Bacteria-mediated delivery of nanoparticles and cargo into cells** *NATURE NANOTECHNOLOGY*  
Akin, D., Sturgis, J., Ragheb, K., Sherman, D., Burkholder, K., Robinson, J. P., Bhunia, A. K., Mohammed, S., Bashir, R.  
2007; 2 (7): 441-449
- **Solid-state nanopore channels with DNA selectivity** *NATURE NANOTECHNOLOGY*  
Iqbal, S. M., Akin, D., Bashir, R.  
2007; 2 (4): 243-248
- **Anomalous resonance in a nanomechanical biosensor** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Gupta, A. K., Nair, P. R., Akin, D., Ladisch, M. R., Broyles, S., Alam, M. A., Bashir, R.  
2006; 103 (36): 13362-13367
- **Single virus particle mass detection using microresonators with nanoscale thickness** *Applied Physics Letters*  
Gupta A., D. Akin, R. Bashir  
2004; 84: 1976-1978
- **Nanomedicine for Spontaneous Brain Tumors: A Companion Clinical Trial.** *ACS nano*  
Arami, H., Patel, C. B., Madsen, S. J., Dickinson, P. J., Davis, R. M., Zeng, Y., Sturges, B. K., Woolard, K. D., Habte, F. G., Akin, D., Sinclair, R., Gambhir, S. S.  
2019
- **Multitarget, quantitative nanoplasmonic electrical field-enhanced resonating device ((NERD)-R-2) for diagnostics** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Inci, F., Filippini, C., Baday, M., Ozen, M. O., Calamak, S., Durmus, N. G., Wang, S., Hanhauser, E., Hobbs, K. S., Juillard, F., Kuang, P. P., Vetter, M. L., Carocci, et al  
2015; 112 (32): E4354-E4363
- **Biotargeted nanomedicines for cancer: six tenets before you begin** *NANOMEDICINE*  
Goldberg, M. S., Hook, S. S., Wang, A. Z., Bulte, J. W., Patri, A. K., Uckun, F. M., Cryns, V. L., Hanes, J., Akin, D., Hall, J. B., Gharkholo, N., Mumper, R. J.  
2013; 8 (2): 299-308
- **Capture and alignment of phi29 viral particles in sub-40 nanometer porous alumina membranes** *BIOMEDICAL MICRODEVICES*  
Moon, J., Akin, D., Xuan, Y., Ye, P. D., Guo, P., Bashir, R.  
2009; 11 (1): 135-142
- **Dielectrophoresis-based cell manipulation using electrodes on a reusable printed circuit board** *LAB ON A CHIP*  
Park, K., Suk, H., Akin, D., Bashir, R.  
2009; 9 (15): 2224-2229
- **Real-time detection of airborne viruses on a mass-sensitive device** *APPLIED PHYSICS LETTERS*  
Lee, J., Jang, J., Akin, D., Savran, C. A., Bashir, R.  
2008; 93 (1)

- **Effects of inlet/outlet configurations on the electrostatic capture of airborne nanoparticles and viruses** *MEASUREMENT SCIENCE & TECHNOLOGY*  
Jang, J., Akin, D., Bashir, R.  
2008; 19 (6)
- **Real-time detection of air-borne viruses on a mass-sensitive device** *Applied Physics Letters*  
Lee, J., J. Jang, D. Akin, C.A. Savran, R. Bashir  
2008; 93 (1): 13901
- **PCR-based detection in a micro-fabricated platform** *LAB ON A CHIP*  
Bhattacharya, S., Salamat, S., Morisette, D., Banada, P., Akin, D., Liu, Y., Bhunia, A. K., Ladisch, M., Bashir, R.  
2008; 8 (7): 1130-1136
- **Effects of inlet/outlet configurations on the electrostatic capture of airborne nanoparticles and viruses** *Measurement Science and Technology*  
Jang J., D. Akin, R. Bashir  
2008; 19: 065204-065212
- **Ultrananocrystalline diamond film as an optimal cell interface for biomedical applications** *BIOMEDICAL MICRODEVICES*  
Bajaj, P., Akin, D., Gupta, A., Sherman, D., Shi, B., Auciello, O., Bashir, R.  
2007; 9 (6): 787-794
- **Electrical capture and lysis of vaccinia virus particles using silicon nano-scale probe array** *BIOMEDICAL MICRODEVICES*  
Park, K., Akin, D., Bashir, R.  
2007; 9 (6): 877-883
- **Biomems and nanotechnology-based approaches for rapid detection of biological entities** *JOURNAL OF RAPID METHODS AND AUTOMATION IN MICROBIOLOGY*  
Bhattacharya, S., Jang, J., Yang, L., Akin, D., Bashir, R.  
2007; 15 (1): 1-32
- **Capture of airborne nanoparticles in swirling flows using non-uniform electrostatic fields for bio-sensor applications** *SENSORS AND ACTUATORS B-CHEMICAL*  
Jang, J., Akin, D., Lim, K. S., Broyles, S., Ladisch, M. R., Bashira, R.  
2007; 121 (2): 560-566
- **Nanotechnology in Biology and Medicine: Methods, Devices, and Applications. Edited by Tuan Vo-Dinh, Book Review.** *ChemMedChem*  
Akin D.  
2007; 2 (10): 1534-1535
- **Biomems and Nanotechnology based approaches for rapid detection of biological entities** *J. Rapid Methods & Automation in Microbiology*  
Bhattacharya, S., J. Jang, L. Yang, D. Akin, R. Bashir  
2007; 15: 1-32
- **Capture of airborne nanoparticles in swirling flows using non-uniform electrostatic fields for bio-sensor applications** *Sensors and Actuators B*  
Jang J., D. Akin, K.S. Lim, S. Broyles, M.R. Ladisch, R. Bashir  
2007; 121: 560-566
- **Characterization of vaccinia virus particles using microscale silicon cantilever resonators and atomic force microscopy** *SENSORS AND ACTUATORS B-CHEMICAL*  
Johnson, L., Gupta, A. T., Ghafoor, A., Akin, D., Bashir, R.  
2006; 115 (1): 189-197
- **Characterization of vaccinia virus particles using microscale silicon cantilever resonators and atomic force microscopy** *Sensors and Actuators B*  
Johnson, L., A. Gupta, D. Akin, A. Ghafoor, R. Bashir  
2006; 115: 189-197
- **Characterization and modeling of a microfluidic dielectrophoresis filter for biological species** *JOURNAL OF MICROELECTROMECHANICAL SYSTEMS*  
Li, H. B., Zheng, Y. N., Akin, D., Bashir, R.  
2005; 14 (1): 103-112
- **Bacterial delivery of smart nanoparticles-loaded with therapeutic molecules into cancer cells** *Nanomedicine*

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- Akin D., K. Ragheb, J. Sturgis, A.K. Bhunia, J.P. Robinson, R. Bashir  
2005; 1: 250
- **Delocalization of vaccinia virus components observed by Atomic Force and Fluorescence Microscopy** *NanoBiotechnology*  
Ghafoor, A\*, D. Akin\*, R. Bashir  
2005; 4: 337-346
  - **Characterization and modeling of a microfluidic dielectrophoresis filter for biological species** *J. Microelectromechanical Systems*  
Li, H., Y. Zheng, D. Akin, R. Bashir  
2005; 143: 103-112
  - **Detection of bacterial cells and antibodies using surface micromachined thin silicon cantilever resonators** *JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B*  
Gupta, A., Akin, D., Bashir, R.  
2004; 22 (6): 2785-2791
  - **Single virus particle mass detection using microresonators with nanoscale thickness** *APPLIED PHYSICS LETTERS*  
Gupta, A., Akin, D., Bashir, R.  
2004; 84 (11): 1976-1978
  - **Real-time virus trapping and fluorescent imaging in microfluidic devices** *NANO LETTERS*  
Akin, D., Li, H. B., Bashir, R.  
2004; 4 (2): 257-259
  - **Detection of bacterial cells and antibodies using surface micromachined thin silicon cantilever resonators.** *J. Vacuum Sci. & Tech. B: Microelectronics and Nanometer Structures*  
Gupta A., D. Akin, R. Bashir  
2004; 22: 2785-2791
  - **Real-time virus trapping and fluorescent imaging in micro-fluidic devices** *Nano Letters*  
Demir Akin, H. Li, R. Bashir  
2004; 4: 257-259
  - **Poly(dimethylsiloxane) (PDMS) and silicon hybrid biochip for bacterial culture** *BIOMEDICAL MICRODEVICES*  
Chang, W. J., Akin, D., Sedlak, M., Ladisch, M. R., Bashir, R.  
2003; 5 (4): 281-290
  - **Integrated nanoscale silicon sensors using top-down fabrication** *APPLIED PHYSICS LETTERS*  
Elibol, O. H., Morisette, D., Akin, D., Denton, J. P., Bashir, R.  
2003; 83 (22): 4613-4615
  - **Microfiber assisted fabrication of microfluidic channels using poly(dimethylsiloxane)** *AICHE JOURNAL*  
Huang, T. T., Chang, W. J., Akin, D., Gomez, R., Bashir, R., Mosier, N., Ladisch, M. R.  
2003; 49 (11): 2984-2987
  - **Micro-assembly of functionalized particulate monolayer on C-18-derivatized SiO<sub>2</sub> surfaces** *BIOTECHNOLOGY AND BIOENGINEERING*  
Huang, T. T., Geng, T., Akin, D., Chang, W. J., Sturgis, J., Bashir, R., Bhunia, A. K., Robinson, J. P., Ladisch, M. R.  
2003; 83 (4): 416-427
  - **Integrated nanoscale silicon sensors using top-down fabrication** *Applied Physics Letters*  
Elibol O.H., D. Morisette, D. Akin, J. P. Denton, R. Bashir  
2003; 83: 4613-4615
  - **Poly(dimethylsiloxane) (PDMS) and silicon hybrid biochip for bacterial culture** *Biomedical Microdevices*  
Chang W.J., D. Akin, R. Bashir  
2003; 5: 281-290
  - **Resonant mass biosensor for ultrasensitive detection of bacterial cells** *Microfluidics, BioMEMS, and Medical Microsystems, Holger Becker, Peter Woias, Editors*  
Gupta A., D. Akin, R. Bashir  
2003; 4982: 21-27